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YES, VIRGINIA, Mid-Size U.S. Farms Really are Disappearing

by

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Few farm issues have sparked as much sustained interest among both the farm and non-farm communities as the alleged disappearance of mid-size U.S. farms. The issue first emerged during the early 1970s when several farm organizations expressed concern about mid-size farms. It eventually became part of the national agenda during the Carter administration.

This article will briefly review the current statistical evidence concerning the hypothesized disappearance. Its contradictory nature leads to a new approach using U.S. medium household income. The conclusion from this new approach is an unequivocal decline in the numerical and economic significance of mid-size farms over the past two decades.

A Confusing Picture

Ambiguity marks the statistical evidence concerning the disappearance of mid-size farms. Many times this ambiguity exists in the same study, let alone all studies taken together. To illustrate, in an excellent analysis, Ahearn adjusted data from the 1974, 1978, and 1982 Agricultural Censuses to constant 1982 dollars using the separate price indexes for crops and livestock. The result was that, between 1974 and 1982, proportion of farms with sales of $40,000-$99,999 decreased from 16 to 15 percent, while proportion of farms with sales of $100,000-249,999 increased from 7 to 10 percent. Furthermore, proportion of net cash farm income accounted for by the smaller sales class declined from 25 to 14 percent but remained constant at about 27 percent for the larger class. These sales categories encompass the commonly discussed range of mid-size farms. Thus, whether mid-size farms declined, as well as the rate of

decline, depended on the sales class(es) chosen and characteristic(s) stressed.

Another factor contributing to the ambiguity is the time-sensitive nature of the statistical evidence. For example, the Congressional Office of Technology Assessment study reported that the share of farm numbers accounted for by farms with sales of $100,000 to $199,999 in 1982 dollars, its definition of moderate size farms, increased from 3 to 8 percent between 1969 and 1982 but is forecast to decline to 6 percent by the year 2000.

The ambiguity, however, is more than just a function of different data sources and study periods. It is also a function of two thorny questions: how is size measured and what is mid-size. Most previous studies have used either inputs, usually acres, or sales to measure size. The use of acres and sales has in part been dictated by the fact that they are the only measures of size consistently collected by the Agricultural Census, and, thus, the only ones available on a national scope for an extended period. Arguments can be made for and against both measures, but sales is generally preferred when a mixture of farms is analyzed. The reason is that the size of non-crop operations depends on inputs other than land.

Once the decision on how to measure size has been addressed, the question of what is a mid-size farm must be answered. With some simplicity, the method used by most researchers has involved personal judgement based on conditions at the time of the study. Personal judgments are obviously subject to intense disagreement. The disagreement compounds when changes over time are analyzed. Even with adjustment for inflation

or other considerations, the adjustments are unlikely to capture all the changes in what constituted a mid-size farm over the period analyzed.

In conclusion, while the alleged disappearance of mid-size farms continues to generate widespread public concern, statistical evidence on its existence and importance remains murky. Policy issues, especially if on the national agenda a long time, generally surface because of an identifiable public concern. Failure to support or refute the disappearing middle hypothesis has undermined the ability to provide guidance on this issue. Consequently, a different statistical approach is needed.

Medium Household Income as a Reference Point

Use of sales or inputs to measure size is predicated on the proposition of relevancy. When concerned with economic performance of an industry, size of a firm's output or its input base can be an important indicator of market power and, therefore, potential malperformance. The concern with mid-size farms, however, is with their survival. Survival depends on the farm providing an acceptable return for its operators. A farm may provide social, cultural, and philosophical as well as economic returns. Therefore, the traditional economic view that for resources to remain on the farm they must earn a return equal to that earned in alternative uses is probably too narrow a survival criterion, especially in the short to medium period. A more realistic survival criterion is that the farm provides a standard of living equivalent to that of the average American household. Should the farm not provide a comparable standard of living, the farm household must either accept a below average

standard of living or find ways to increase its income (get larger, get out, or get a second income).

To avoid the disproportionate impact that very high income households have on average income, medium household income was chosen to operationalize this concept. Also, medium household income for all households was used instead of medium, non-metropolitan household income because the latter is available only since 1975 compared with 1967 for the former. Therefore, in this analysis, a mid-size farm is defined as one that provides the farm household with income from the farm equal to the median income for all U.S. households. Note, because of off-farm income a farm which meets this criterion probably has total income in excess of medium household income. Nevertheless, if the farm household so chose, medium household income could be earned from the farm only.

Because medium household income has been collected since 1967, it provides a standard to identify equivalently defined mid-size farms over time. Compared with other frequently-used adjustment factors, medium household income increased 231 percent, while the consumer price index and prices received by farmers increased 222 and 133 percent respectively between 1967 and 1985.

Analysis

The source for the farm sector data used in this analysis was the U.S. Department of Agriculture's (USDA) data series that reports farm characteristics by farm sales class. The source for median household income was the U.S. Department of Commerce. Since median household income only includes money income, USDA's net farm income was made comparable by

subtracting the value of food consumed on the farm and net rental value of farm operator household dwellings. For lack of better information, the adjustment was assumed to be the same per farm; and, thus, the total value of the adjustment was apportioned among the sales classes in relation to the proportion of farms in each sales class.

To estimate the farm sales level associated with medium household income and the characteristics of farms associated with medium household income, a decumulative polynomial function was estimated for net farm income, farm numbers, and other characteristics using the sales category data. A decumulative function addresses the questions of how much of one variable occurs in excess of a given value of another variable. For example, a data point in this analysis was the amount of net farm income earned by farms with sales over $100,000. Use of the decumulative function is based on the assumption that the best indicator of the unknown continuous distribution of farm characteristics across farm sales is the reported distribution of farm characteristics by farm sales categories. (For a discussion of this function see Lin, Coffman, and Penn.)

Because USDA sales data uses the Census of Agriculture as its benchmark, data for census years are considered a more accurate representation of the underlying distribution of farm characteristics than data for non-census years. Therefore, decumulative functions were estimated for census years 1969, 1974, 1978, and 1982. They were also estimated for the last year sales data is available, 1985, to bring the analysis up-to-date.

Using the decumulative functions for net farm income and number of farms, progressively smaller sales categories were tried until the farm

sales level which yielded adjusted net farm income equal to medium household income was identified. These sales levels were:

Year	Medium Household Income	Farm Sales
1969	$ 8,389	$23,095
1974	$11,197	$37,555
1978	$15,064	$82,635
1982	$20,171	$148,705
1985	$23,618	$126,375

The decline in sales from 1982 to 1985 reflect a higher net farm income in 1985: $31.6 vs. $24.0 billion before inventory adjustment.

Mid-size farms are likely associated with a range of farm income. Several ranges were tried, and all yielded the same trends. The range presented is medium household income plus or minus 50 percent of medium household income. Small and large farms are, therefore, defined as having adjusted net farm income that falls below and above, respectively, the income range for mid-size farms. The specific farm sales associated with mid-size farms range from $12,135-$35,115 in 1969, $20,375-$54,825 in 1974, $48,755-$117,265 in 1978, $107,575-$186,425 in 1982, and $90,055-$160,575 in 1985. Note, the ranges for 1982 and 1985 fall within the range currently associated with mid-size farms.

Mid-Size Farms Declined

Results of the analysis are presented for proportion of farm numbers, gross cash farm income, and adjusted net farm income by farm size (Figures 1-3). The contribution of mid-size farms to the farm sector declined for all three measures between 1969 and 1985: farm numbers, from 18 to 7

percent; gross cash farm income, from 27 to 15 percent; and net farm income, from 32 to 14 percent. Therefore, whether measured by numbers, output, or profit, mid-size farms declined in importance.

In contrast, the share of farm numbers and gross cash farm income accounted for by small farms increased, but their contribution to sector net farm income decreased. Large farms exhibited no trend in their proportion of farm numbers, a slight increase in their share of gross cash income, and a dramatic increase in their contribution to adjusted net farm income. By 1985 they accounted for 109 percent of adjusted net farm income. Thus, both small and large farms increased in importance relative to output. Small farms also increased in numerical importance while large farms increased their share of profits.

Summary and Conclusions

Few issues have sparked as much debate and concern as the alleged disappearance of mid-size farms. The evidence from statistical analyses of this hypothesis are, however, ambiguous. A new approach using medium U.S. household income instead of sales or level of inputs to define mid-size farms was investigated. It found support for the declining significance of mid-size farms since the late 1960s whether measured in terms of numbers, output, or profits.

This broad-based conclusion begs the question of whether mid-size farms will continue to decline in importance. While there is room for additional decline, the role of mid-size farms is already fairly small. Thus, numerical considerations argue for at least a slowing in the rate of decline.

Ultimately, the future of mid-size farms depends on the interaction of a complex set of factors. The apparent lack of diseconomies of size in farm production will tend to concentrate production. This trend will be assisted by the growing uncertainty in the farming environment. This places a premium on macro-managerial skills such as finance, taxes, and marketing, which appear to be positively related to farm size. On the other hand, the stability of nonfarm income will tend to lure mid-size farms, perhaps causing them to downsize.

Nevertheless, several emerging considerations suggest it may be too early to write off mid-size farms. One is continuing high real interest rates. The higher opportunity cost of capital as well as cost of borrowed funds may work against large farms and in favor of less capital intensive mid-size farms. A second consideration is the potential micro-managerial intensive nature of new biotechnologies. These new technologies may well place a premium upon production managerial knowledge of the micro environment of farming in order to obtain maximum efficiency. For example, if bovine growth hormone must be injected each day and carefully monitored in the process, this might give an advantage to smaller and mid-size farms. Lastly, the national concern with distribution of farm program benefits may yield more restrictive payment limits. This would tend to push large farms back into the mid-size category.

While the past two decades have produced a substantial and broad-based decline in the importance of mid-size farms, the past must be used with caution to predict the future. Policy solutions, therefore, need to be evaluated carefully so that they do not speed the demise of the farmers they seek to help.

References

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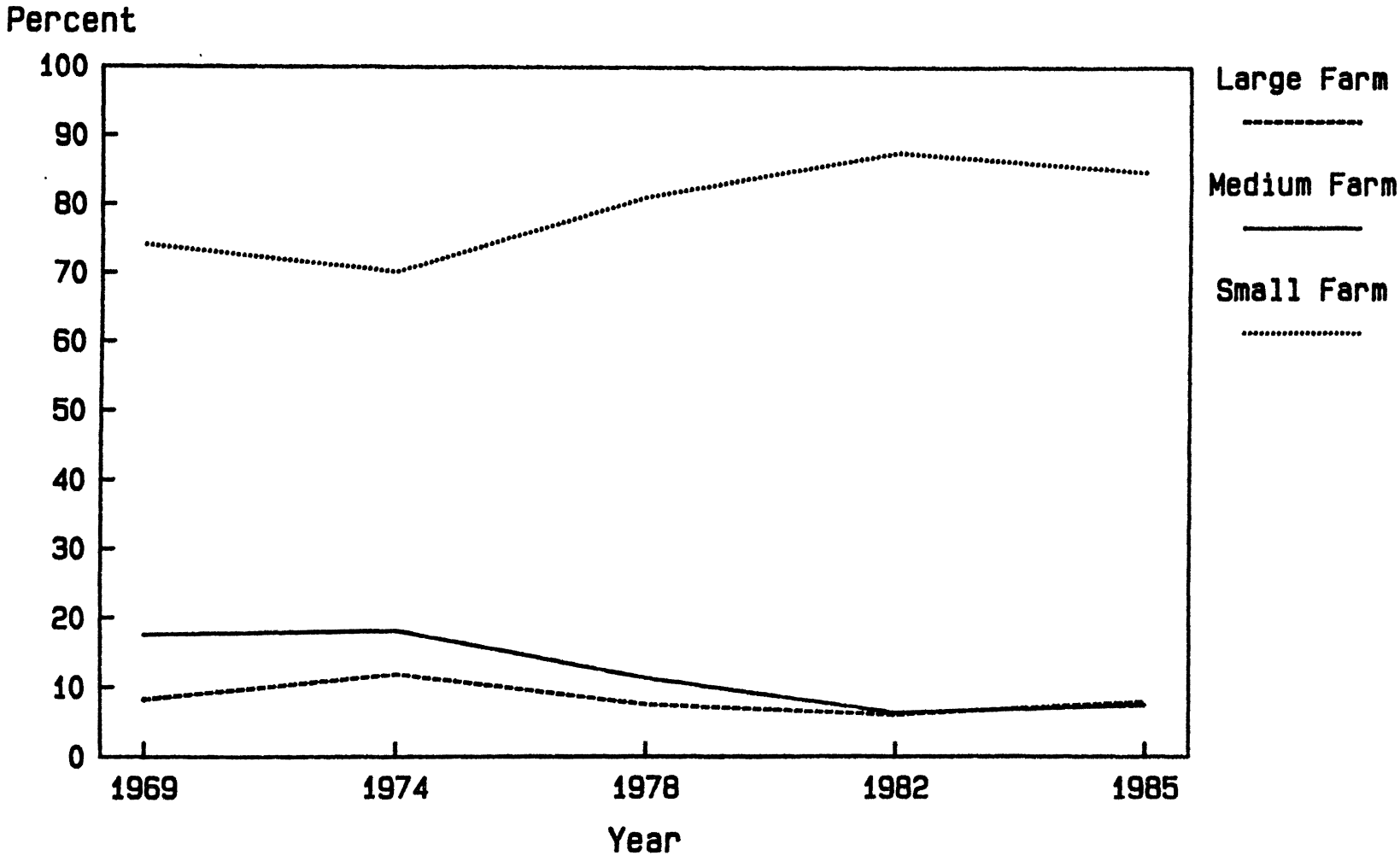
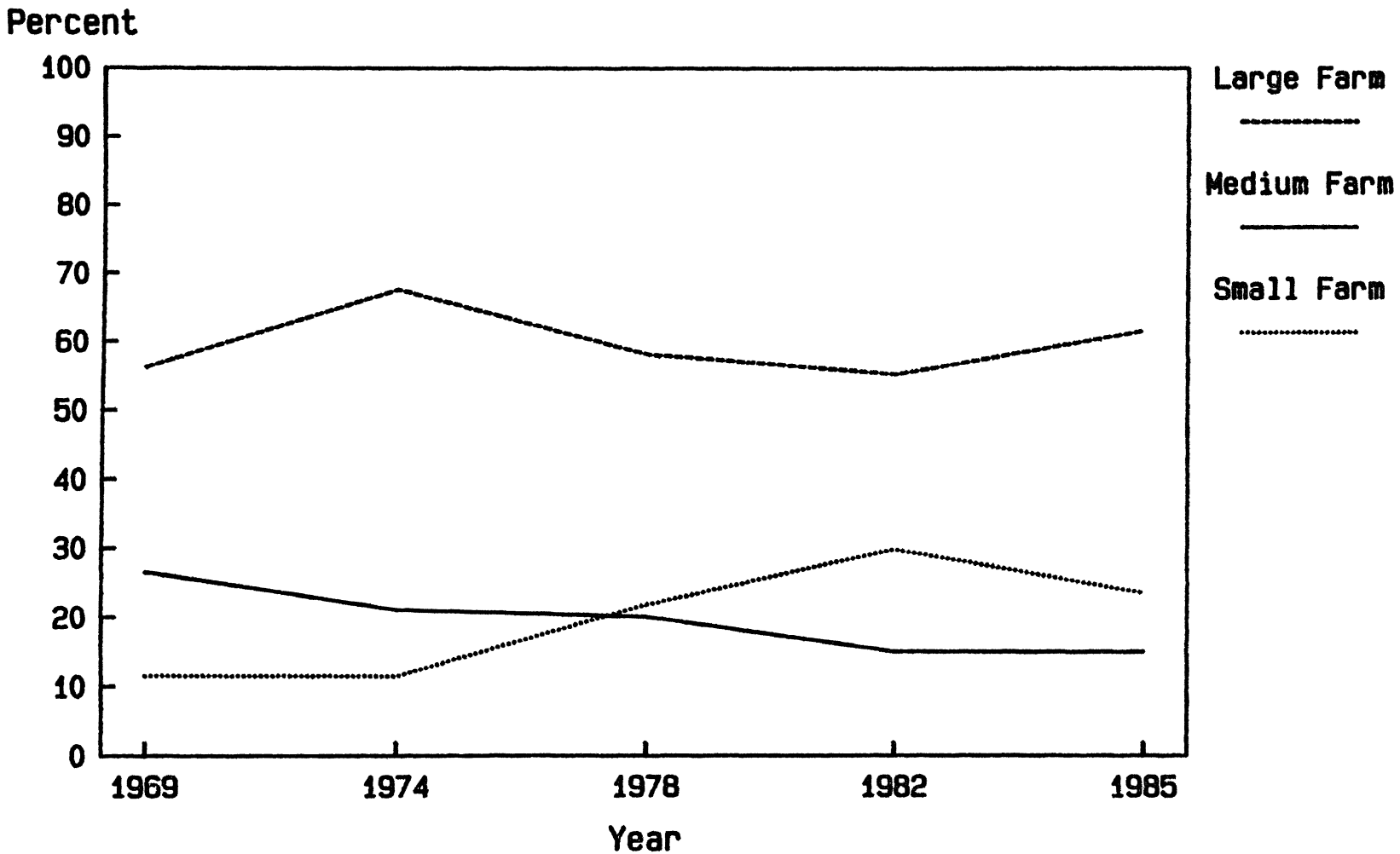
Figure 1. Proportion of Farms by Farm Size, U.S., Selected Years, 1969-85*



* For definition of farm sizes see text.

Source: Original calculations based on data in ECONOMIC INDICATIONS OF THE FARM SECTOR: NATIONAL FINANCIAL SUMMARY, 1985

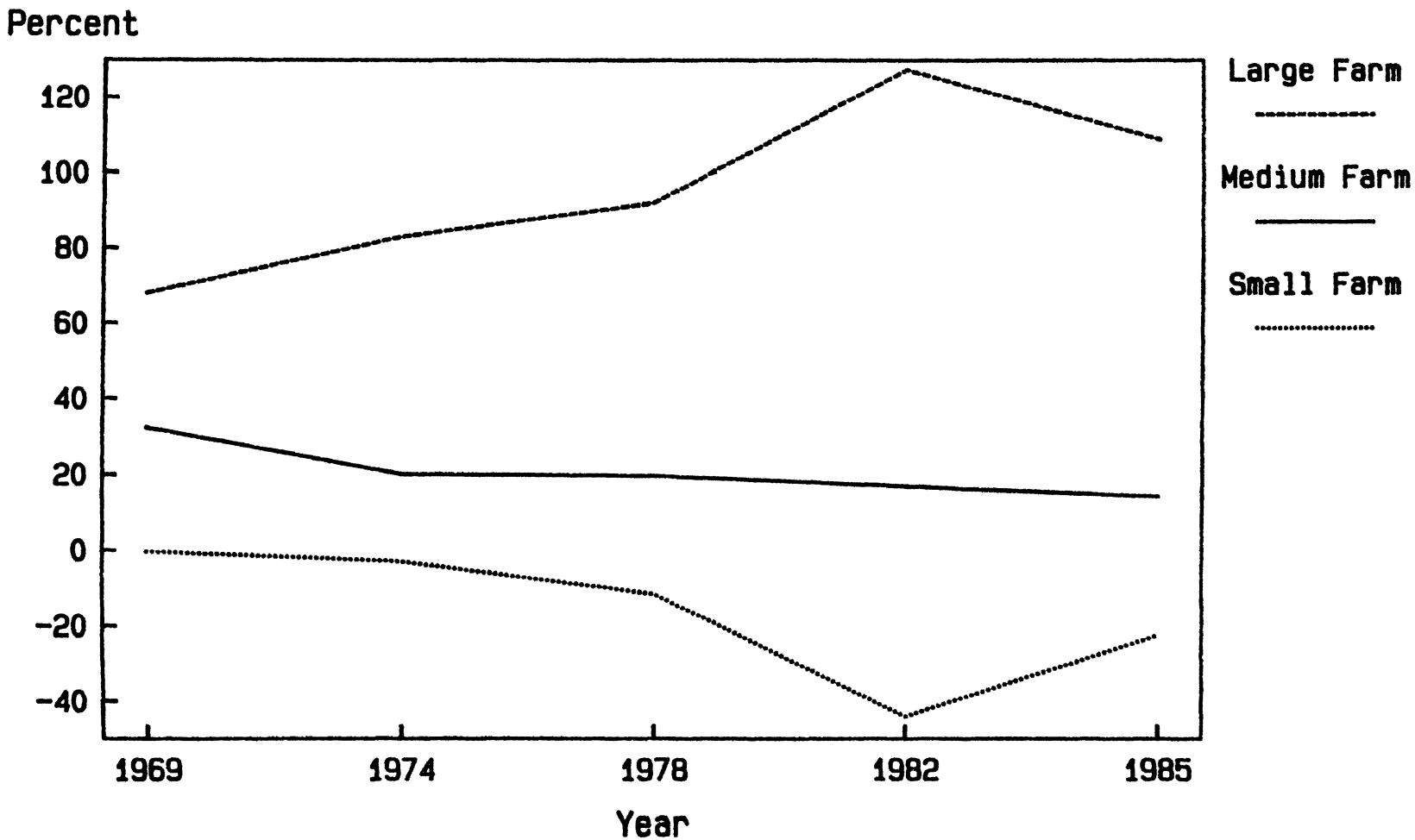
Figure 2. Proportion of Gross Cash Farm Income By Farm Size, U.S., Selected Years, 1969-85.*



* For definition of farm sizes see text.

Source: Original calculations based on data in ECONOMIC INDICATIONS OF THE FARM SECTOR: NATIONAL FINANCIAL SUMMARY, 1985

Figure 3. Contribution to Net Farm Income by Farm Size, U.S., Selected Years 1969-85. *



* For definition of farm size see text.

Source: Original calculations based on data in ECONOMIC INDICATIONS OF THE FARM SECTOR: NATIONAL FINANCIAL SUMMARY, 1985

Table 1. **Selected Characteristics of Medium-Size Farms, Selected Years, 1960-1985, U.S.**[a]

Year	Number of Farms (thousand)	Proportion of Farms	Proportion of Gross Cash Farm Income	Proportion of Net Farm Income	Proportion of Income from Non-Farm Sources
			%		
1960	1,021	25.8	40.6	--[b]	--[b]
1964	916	26.5	39.4	--[b]	--[b]
1969	528	17.6	26.5	32.3	31.3
1974	507	18.1	21.0	20.0	34.1
1978	277	11.3	20.0	19.6	35.8
1982	152	6.3	15.0	16.8	34.5
1985	169	7.4	14.9	14.1	32.3

a Medium size farms are farms which had an adjusted net farm income between 50 and 150 percent of medium household income. Adjusted net farm income equals net farm income minus net rental value of operator dwelling and on-farm consumption of crops and livestock.

b Beginning with 1969, a new methodology was used to prorate income and expense items among sales classes. Its effect was especially pronounced upon the distribution of expenses and, thus, net farm income. For comparability concerns, the variables utilizing net farm income have not been included in the table.

SOURCE: Original calculations based on data in ECONOMIC INDICATORS OF THE FARM SECTOR: NATIONAL FINANCIAL SUMMARY, 1985.

Table 2. Selected Characteristics of Small Size Farms, Selected Years, 1960-1985, U.S.[a]

Year	Number of Farms (thousand)	Proportion of Farms	Proportion of Gross Cash Farm Income	Proportion of Net Farm Income	Proportion of Income from Non-Farm Sources
			%		
1960	2,737	69.1	17.6	--[b]	--[b]
1964	2,342	67.7	14.9	--[b]	--[b]
1969	2,219	74.1	11.5	-0.4	100.3
1974	1,969	70.1	11.4	-3.1	103.5
1978	1,982	81.1	21.8	-11.7	109.2
1982	2,101	87.6	29.8	-44.2	128.1
1985	1,926	84.7	23.4	-22.8	119.1

a Small farms are farms which had an adjusted net farm income less than 50 percent of medium household income. Adjusted net farm income equals net farm income minus net rental value of operator dwellings and on-farm consumption of crops and livestock.

b Beginning with 1969, a new methodology was used to prorate income and expense items among sales classes. Its effect was especially pronounced upon the distribution of expenses and, thus, net farm income. For comparability concerns, the variables utilizing net farm income have not been included in the table.

SOURCE: Original calculations based on data in ECONOMIC INDICATORS OF THE FARM SECTOR: NATIONAL FINANCIAL SUMMARY, 1985.

Table 3. Selected Characteristics of Large Size Farms, Selected Years, 1960-1985, U.S.[a]

Year	Number of Farms (thousand)	Proportion of Farms	Proportion of Gross Cash Farm Income	Proportion of Net Farm Income	Proportion of Income from Non-Farm Sources
			%		
1960	204	5.1	41.8	--[b]	--[b]
1964	200	5.8	45.7	--[b]	--[b]
1969	246	8.2	56.3	68.1	11.6
1974	331	11.8	67.6	83.1	10.2
1978	184	7.5	58.1	92.1	9.2
1982	145	6.0	55.2	127.4	7.7
1985	179	7.9	61.6	108.8	7.1

a Large farms are farms which had an adjusted net farm income greater than 150 percent of medium household income. Adjusted net farm income equals net farm income minus net rental value of operator dwelling and on-farm consumption of crops and livestock.

b Beginning with 1969, a new methodology was used to prorate income and expense items among sales classes. Its effect was especially pronounced upon the distribution of expenses and, thus, net farm income. For comparability concerns, the variables utilizing net farm income have not been included in the table.

SOURCE: Original calculations based on data in ECONOMIC INDICATORS OF THE FARM SECTOR: NATIONAL FINANCIAL SUMMARY, 1985.